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NASA TECH BRIEF

Study Made of Pneumatic High Pressure Piping Materials (10,000 psi)

The storage and transfer of purging and pressurizing media (nitrogen and helium) require high pressures for increased efficiency. These media are presently stored and transferred in the 6000 psi range. The continuous development of new and larger flight vehicles requires that these media be handled at much higher pressures. This increase in pressure requires additional piping system strength. To meet these and other criteria, a study program was initiated to develop and test new 10,000 pound high pressure piping materials.

The basic system requirements for the new tubing material are: (1) good weldability; (2) yield strength 75,000–90,000 psi; (3) ultimate strength 90,000–110,000 psi; (4) elongation 17% minimum; (5) charpy V-notch 15 ft/lb minimum at −150°F; (6) costs of the new material should be competitive with presently available materials.

The steels selected for testing were: AISI 4320 (5% nickel); AISI 4320 (3-1/2% nickel); AISI 4615; AISI 8615; and AISI 9310. Each of these steels was evaluated for use in high pressure pneumatic piping systems in accordance with the following criteria: impact strength; tensile and yield strengths; elongation and reduction in area; field weldability; and cost.

The test results showed that both AISI 4615 and AISI 9310 are equal to, or better than AISI 4320 at 10,000 pounds and temperatures from ambient to −150°F. AISI 4615 would be most advantageous for extensive use, since the cost is lower than AISI 4320, and much lower than AISI 9310.

Notes:

1. Complete details of this study are contained in the Boeing Company New Technology Report BATC No. 65, *Technical Data on Pneumatic High Pressure Piping Materials*, by J. C. Smith and M. B. Loeb, May 15, 1967.
2. Copies of this report are available from:
   Technology Utilization Officer
   Kennedy Space Center
   Kennedy Space Center, Florida 32899
   Reference: B67-10437

Patent status:

No patent action is contemplated by NASA.

Source: Jesse C. Smith and Marx B. Loeb
of The Boeing Company
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